CDF
CMEX
UPGRADE

STRUCTURAL
AND
MECHANICAL
DESIGN

INTRODUCTION

INTRODUCTION

The CMEX (Central Muon Extension) Upgrade is a complex structure consisting of an outer support frame (blue in color), an inner conical frame (yellow in color), and aluminum, pie-shaped muon chambers with a scintilator cover surrounding each chamber. The previous version of CMEX called for a supporting frame and inner frame to house 6 muon chambers. 3 additional chambers were to be hung from the ceiling in the collision hall at CDF. However, due to additional placement of dirt on top of the collision hall, it was not permitted to add additional loads to the ceiling. A new approach was needed.

The CMEX project took a different turn when it was decided to increase the number of mounted chambers on the rolling base from 6 chambers to a possible 9. This change required a redesign of the outer supporting frame as well as a new stress analysis based on a 3D finite element model of the entire structure. Also, stability became an issue of even greater concern since the height of this frame would be increased but the width of the base would not. Sizing of frame members would need to be looked at again as well as bolted joint connections. Also, additional weight would need to be added to the base to help lower the center of gravity.

On a positive note, extending the frame to accommodate 3 more chambers would be easier than designing from scratch the previous concept of ceiling mounted chambers. Assembly would be easier and the integrity of the physics would be maintained with the 9 chamber "Super Cone" design. However, the disadvantage would then be that the entire structure would have to be lifted from one elevation to another higher elevation inside the collision hall. This poses a slight problem that will be solved by CDF personnel.

In general, this packet investigates the effects of an increased number of chambers and verifies that the new design concepts meet AISC codes.

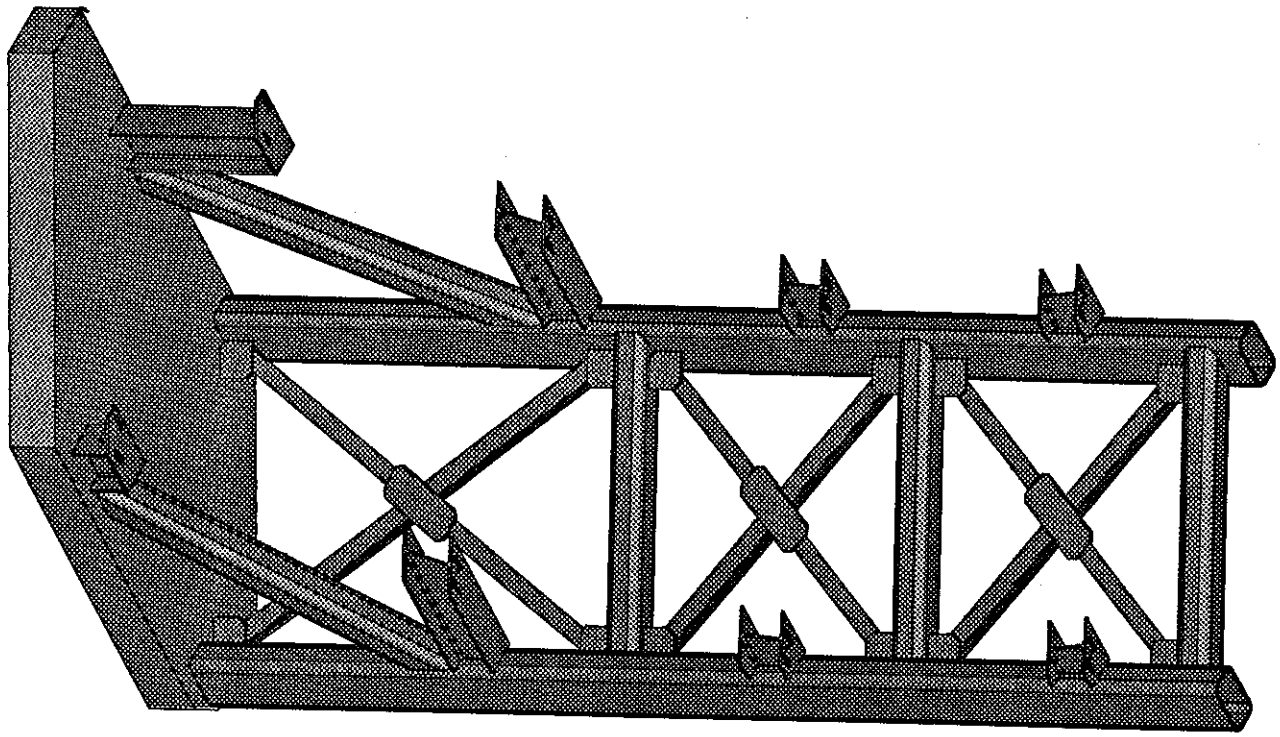
SDRC I-DEAS V: Solid_Modeling

Database: OLD FILE DET0611
View : No stored View
Task: ASSEMBLY
System: 25-MD297027

28-JAN-91 08:09:17

Units : IN
Display : No stored Option
Bin: 42-CMEX SUPPT CRADLE-LH
Update Level: Full

OLD DESIGN

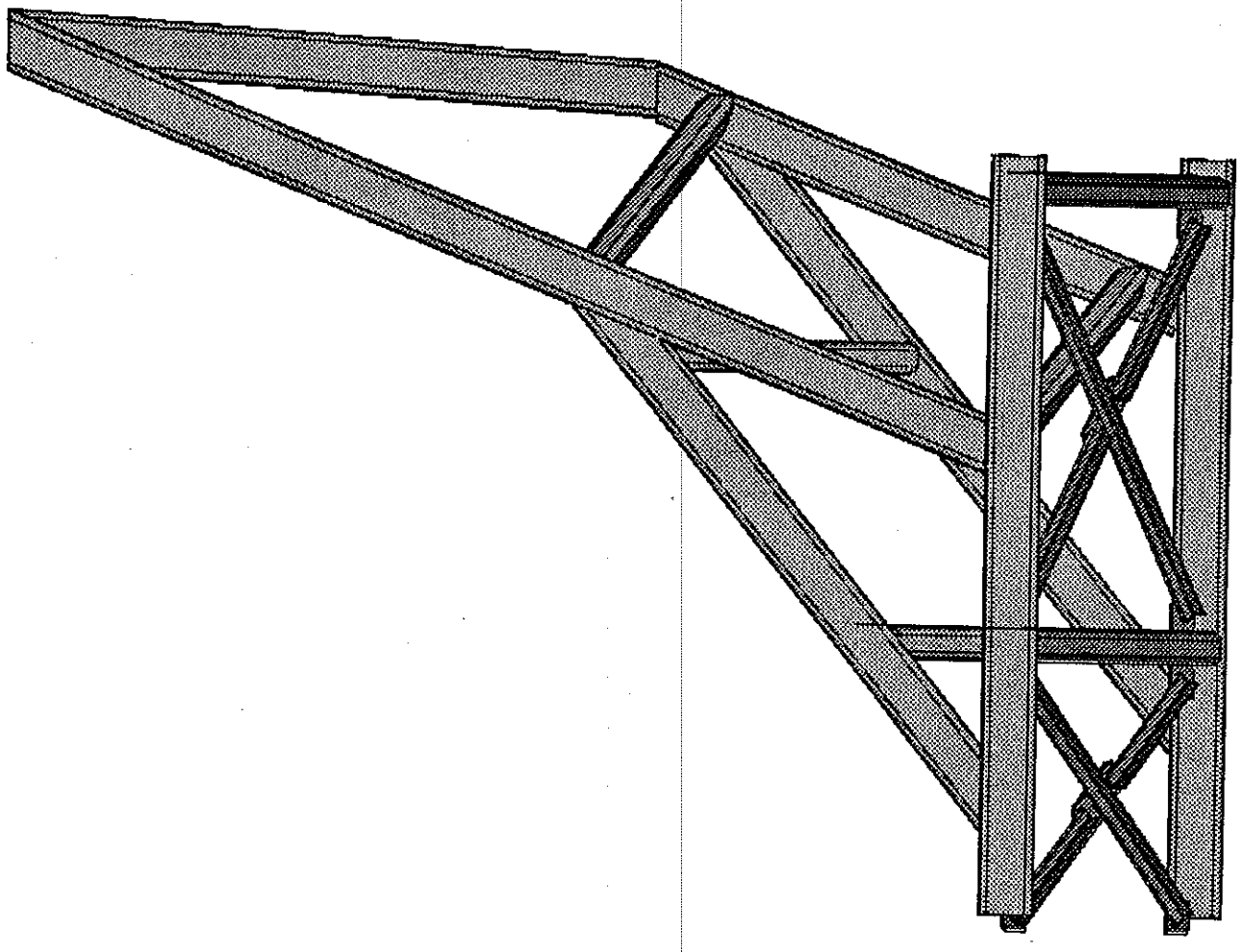


X Z Y

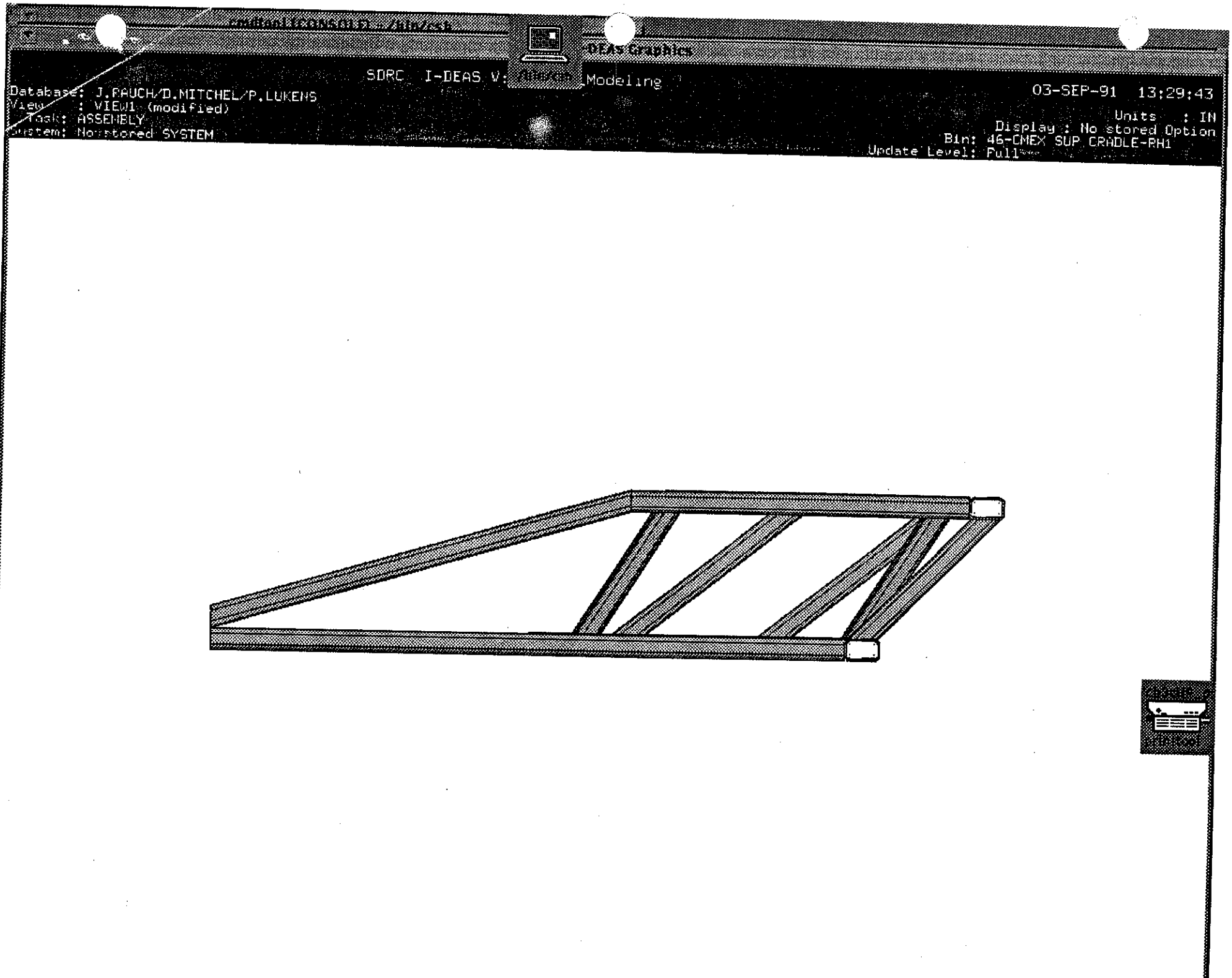
SDRC I-DEAS V: Solid_Modeling

Database: J.PAUCH/D.MITCHEL/P.LUKENS
View : VIEW1 (modified)
Task: ASSEMBLY
System: No stored SYSTEM

03-SEP-91 13:26:01
Units : IN
Display : No stored Option
Bin: 46-CMEX SUP CRADLE-RH1
Update Level: Full

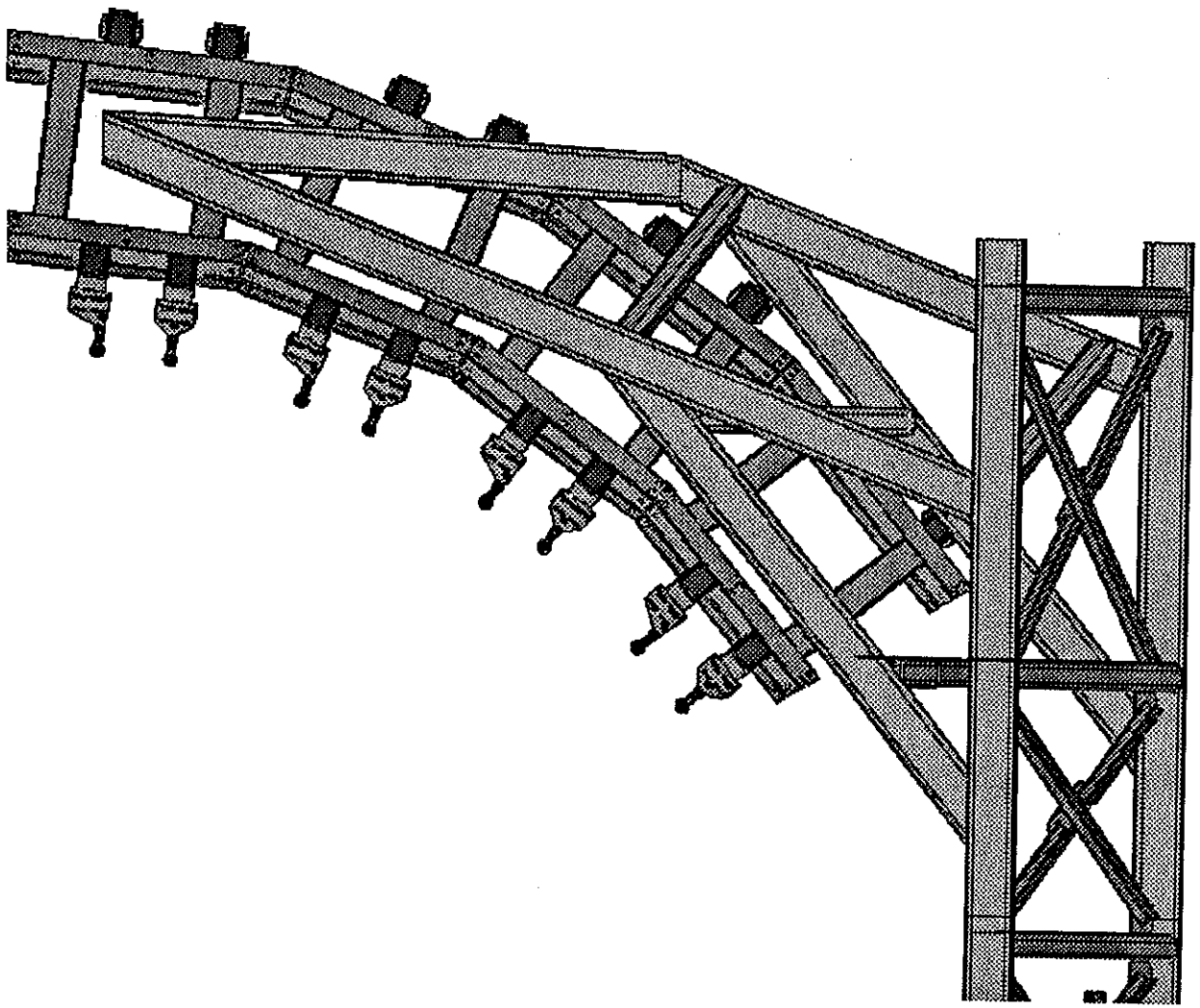


Added Structure


I-DEAS Graphics
SDRC I-DEAS V:
Modeling
Database: J.RAUCH/D.MITCHEL/P.LUKENS
View : VIEW1 (modified)
Task: ASSEMBLY
System: No stored SYSTEM
03-SEP-91 13:29:43
Units : IN
Display : No stored Option
Bin: 46-CMEX SUP CRADLE-RH1
Update Level: Full

tabase: J.RAUCH/D.MITCHEL/P.LUKENS
ew : VIEW1 (modified)
Task: ASSEMBLY
stem: No stored SYSTEM

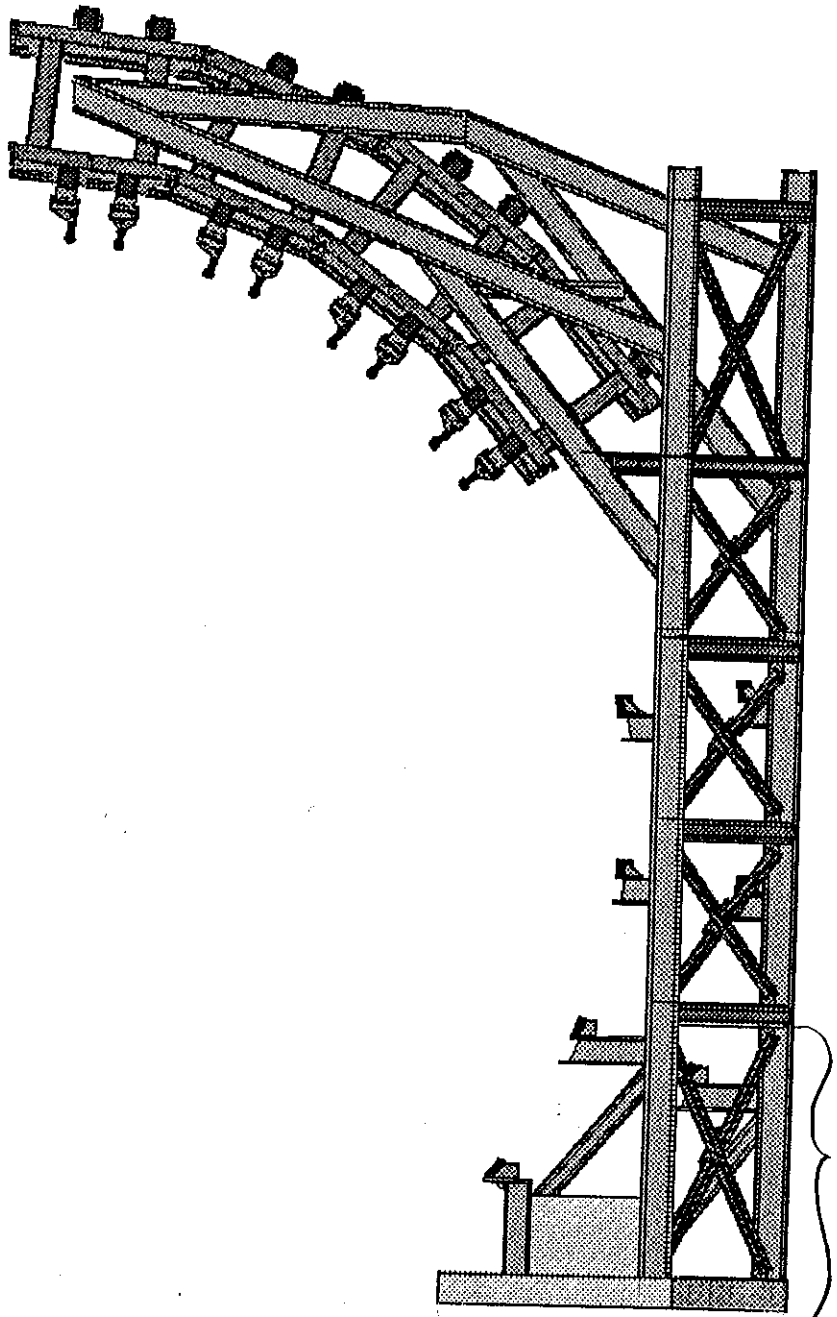
Units : I
Display : No stored Optio
Bin: 46-CMEX SUP CRADLE-RH1
Update Level: Full



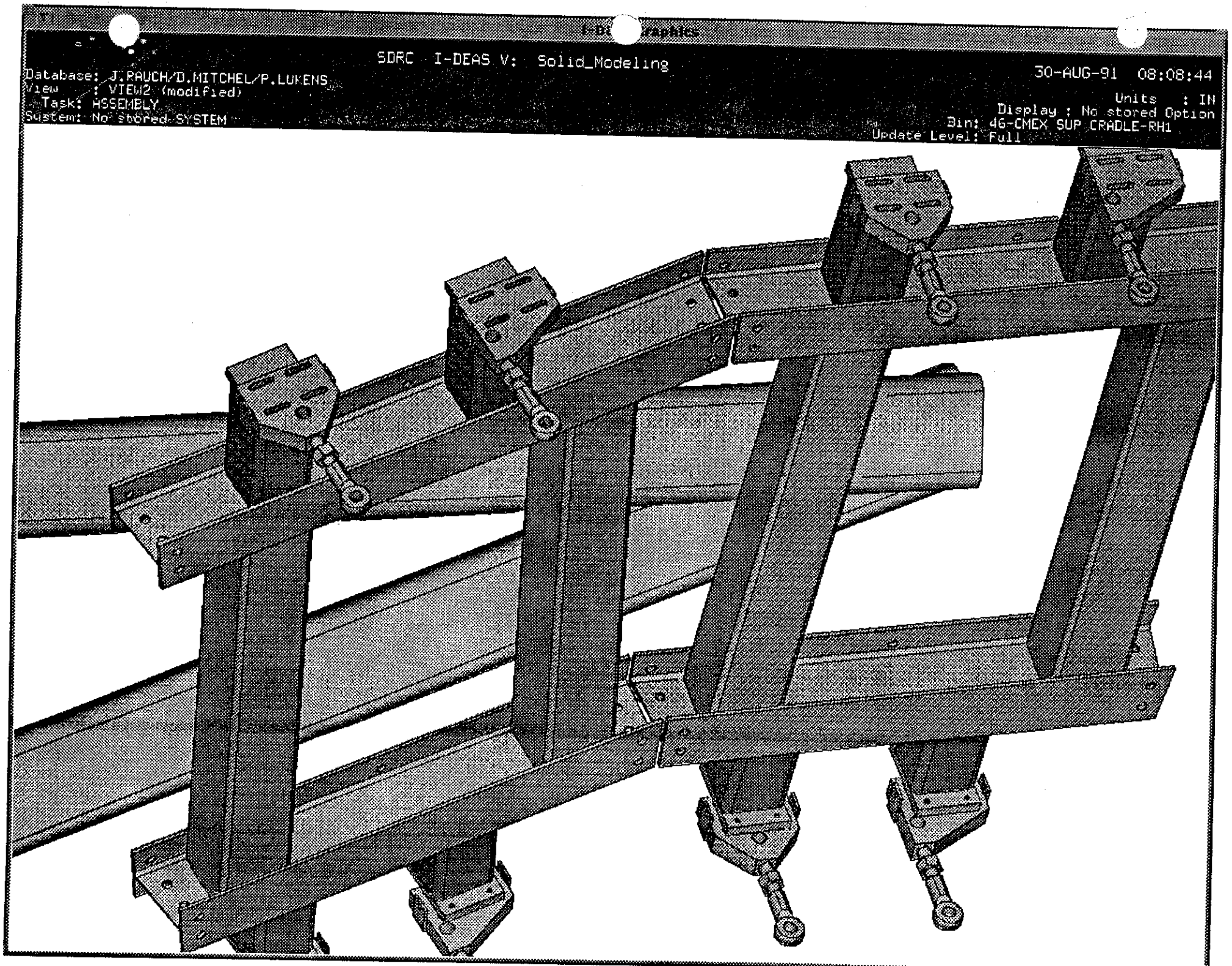
SDRC I-DEAS V: Modeling

Database: J.PAUCH/D.MITCHEL/P.LUKENS
View : VIEW2 (modified)
Task: ASSEMBLY
System: No stored SYSTEM

30-AUG-91 09:36:31
Units : IN
Display : No stored Option
Bin: 46-CMEX SUP CRADLE-RH1
Update Level: Full



More steel to be added to fill this volume.

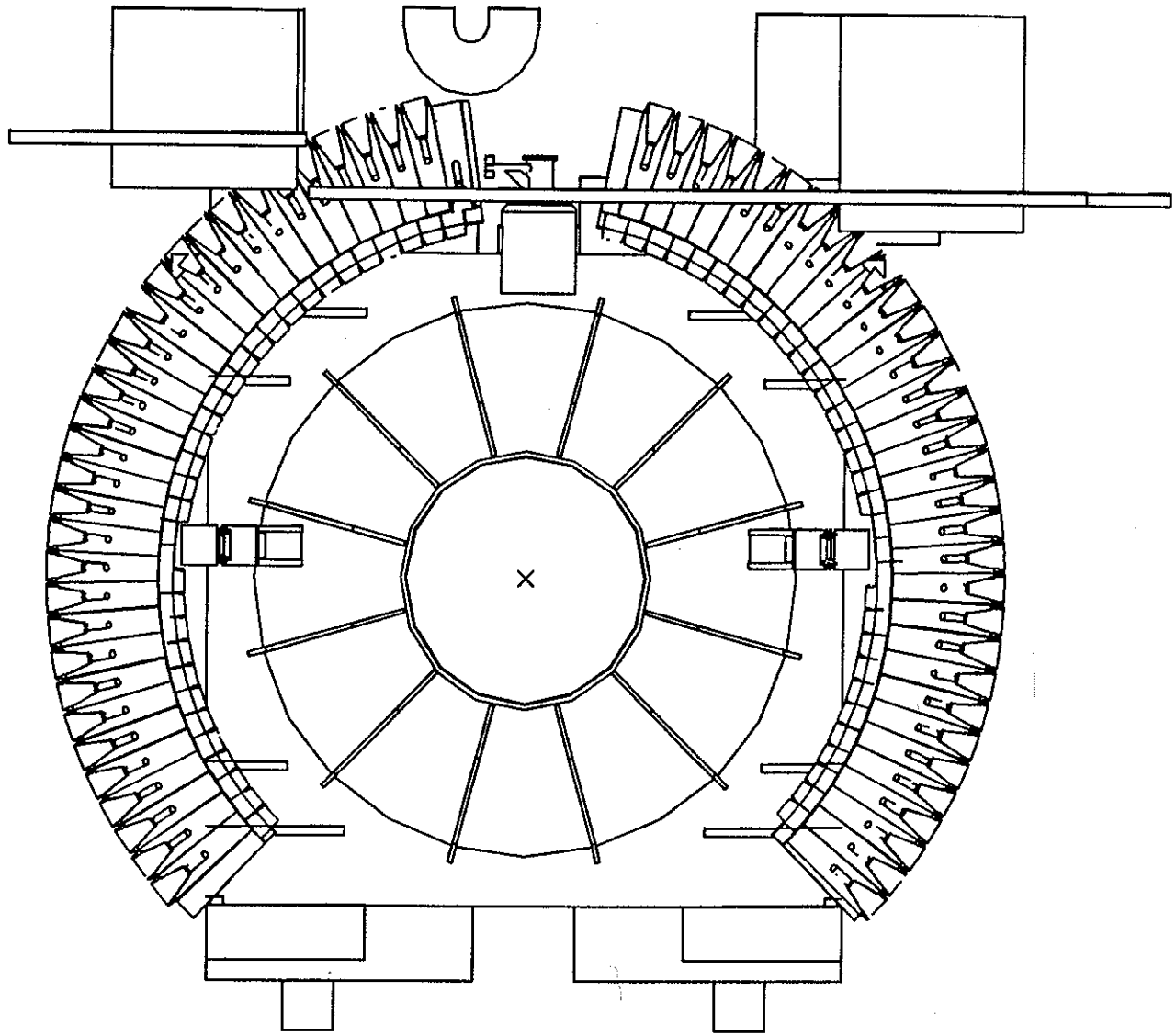

SDRC I-DEAS V: Solid_Modeling
Database: J.RAUCH/D.MITCHEL/P.LUKENS
View : VIEW2 (modified)
Task: ASSEMBLY
System: No stored SYSTEM
30-AUG-91 08:08:44
Units : IN
Display : No stored Option
Bin: 46-CMEX SUP CRADLE-RH1
Update Level: Full

SDRC I-DEAS 4.1: System Assembly 18-APR-90 12:05:16

DATABASE: DET041290
VIEW : VIEW12 (modified)
Task: HIERARCHY
System: 7-SCIN-248(EXTEND) (modifie

UNITS : MM
DISPLAY : No stored OPTION
Bin: 40-EXTENDED SCIN.
Component: No stored COMPONENT

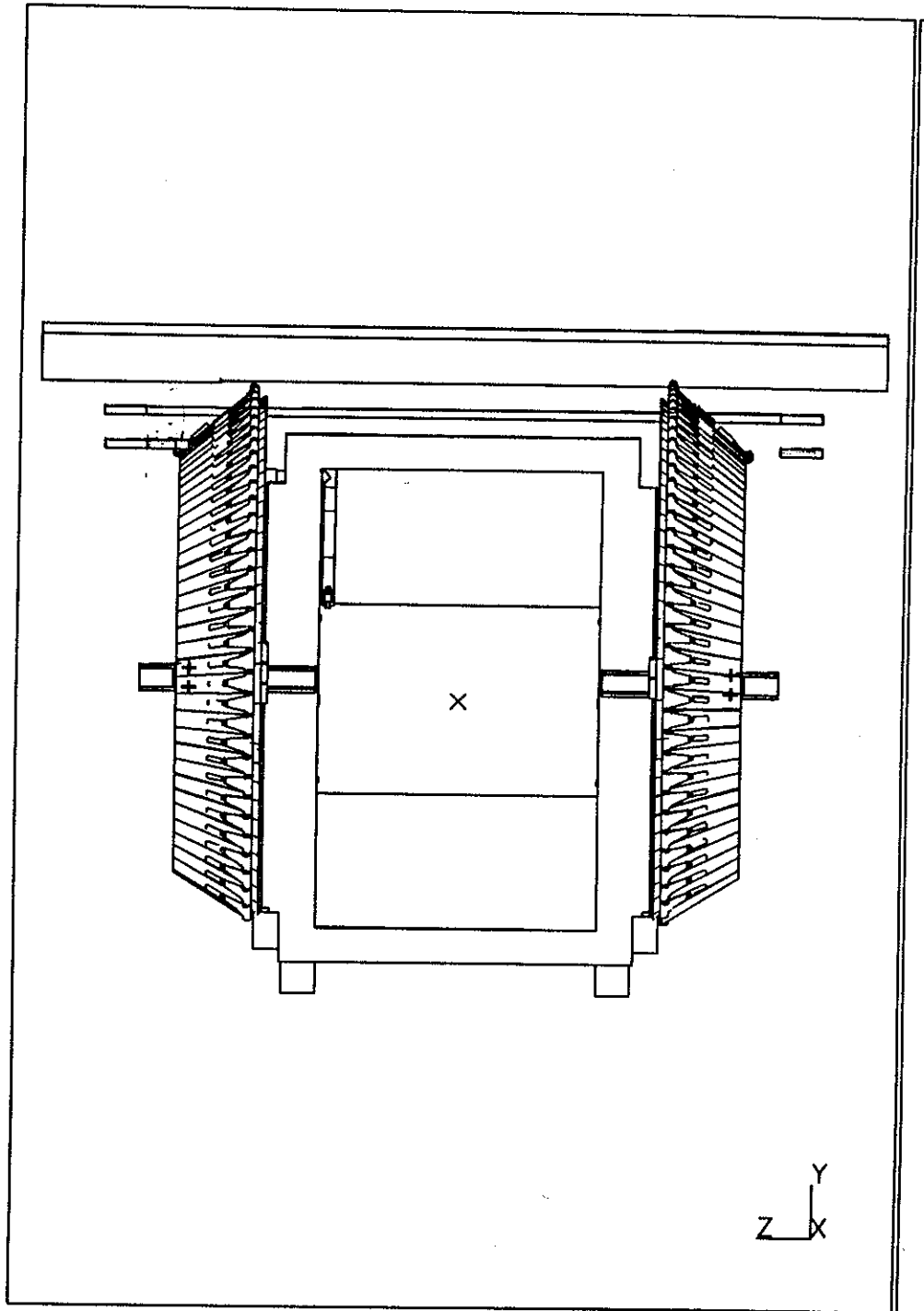
EAST VIEW



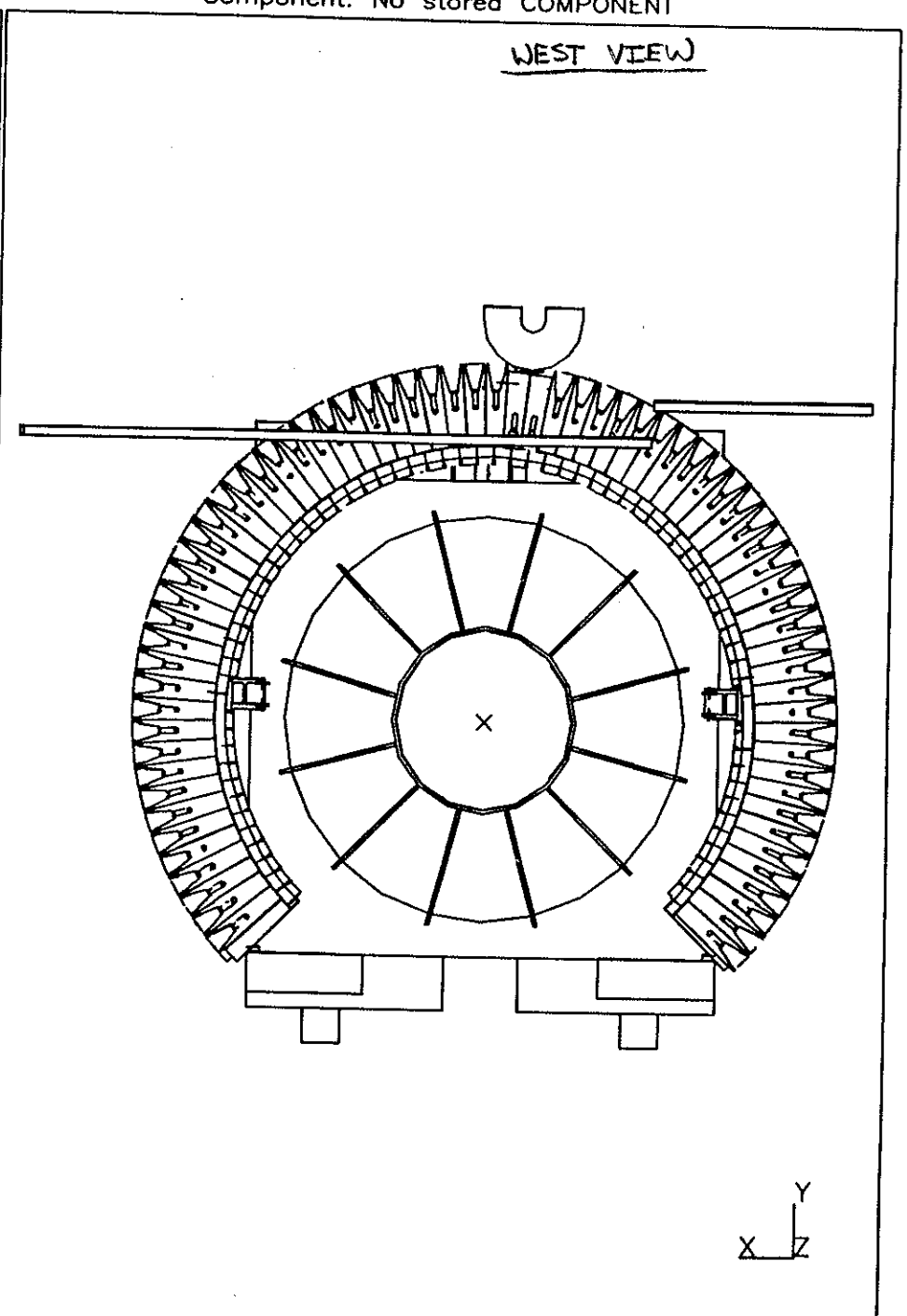
SDRC I-DEAS 4.0: System Assem

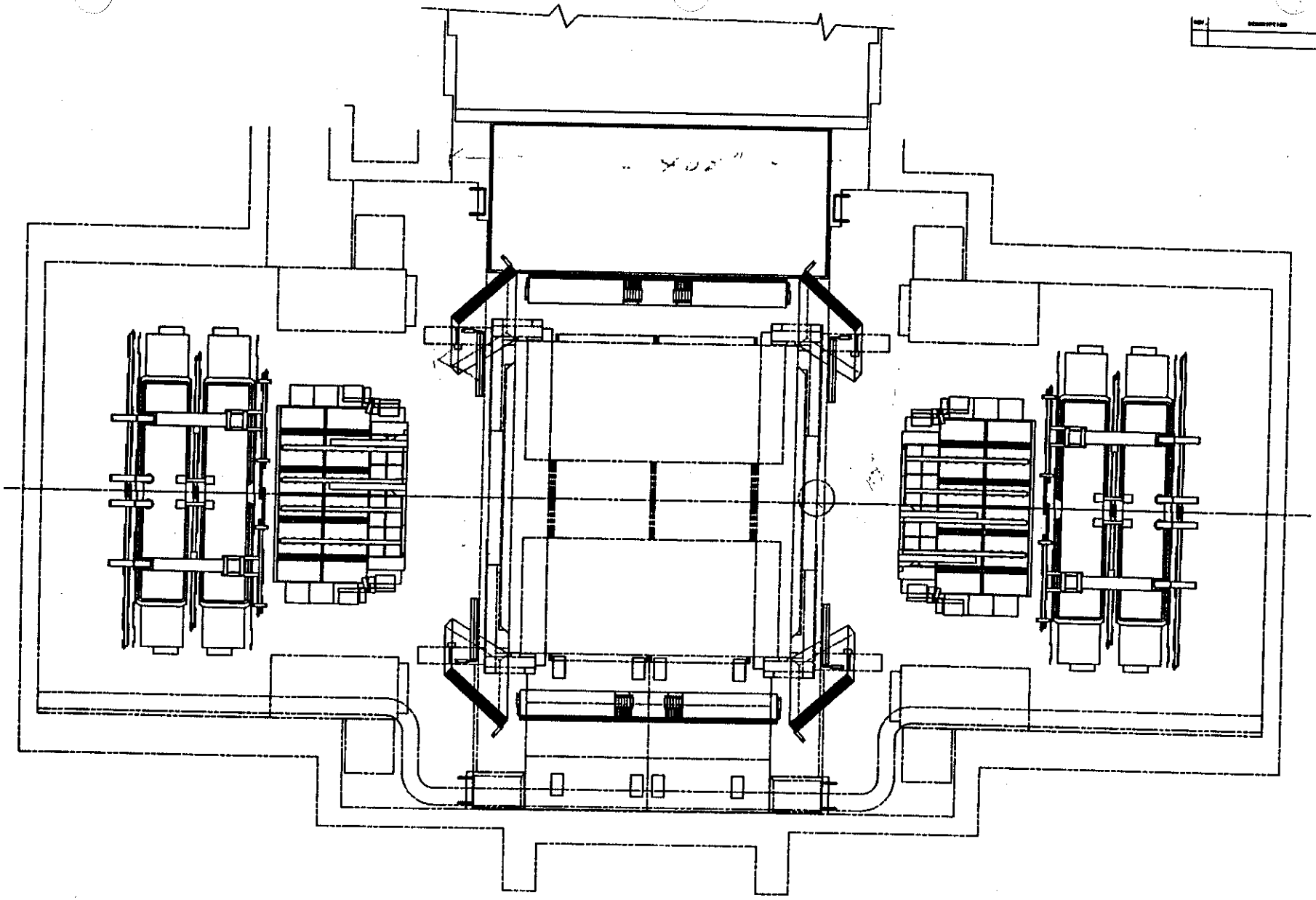
DATABASE: DET0423
VIEW : none, none
Task: HIERARCHY
System: 10-CONIC ASSEMBLY

23-APR-90 14:2 27
UNITS : SI
DISPLAY : none, none
Bin: 40-EXTENDED SCIN.
Component: No stored COMPONENT



WEST VIEW





N
W E
S

PARTS LIST

FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

COLLIDER DETECTOR PLAN VIEW
CENTRAL MUON UPGRADE
FULL COLLISION HALL

1/32

2563.0-ME-282424